

ON VOLCANIC ACTIVITY ON THE ISLANDS NEAR  
THE NORTH-EAST COAST OF NEW GUINEA AND  
EVIDENCE OF RISING OF THE MACLAY-COAST  
IN NEW GUINEA.

BY N. DE MIKLOUHO-MACLAY.

During my first stay at Maclay-Coast in 1871 and 1872 I recorded in my Meteorological Journal not less than 13 shocks of earthquakes (1). Some of them were strong enough to shake the books out of the shelves and make some old trees in the forest fall down. On my return to the same coast in June 1876, I was struck by the change in the aspect of the tops of Mana-Boro-Boro (Finisterre Mountains), which were before my departure (in Dec. 1872) covered with vegetation to the highest summits, but appeared now in many places quite denuded of trees. The natives told me that during my absence they had experienced on the coast and the mountains several earthquakes, on which occasions some natives were killed by the falling of cocoanut trees in the villages, which in falling destroyed the huts. The villages on the coast suffered more on account of unusually big waves which followed soon after the earthquake, breaking down the cocoanut trees and sweeping away a few huts nearest to the beach. In revisiting the coast villages, I found many not unimportant changes: stretches of destroyed forest by tidal waves after the earthquake; alteration in the

(1) *N. de Maclay* Notice Météorologique concernant la Côte-Maclay en Nouvelle-Guinée, in *Natuurkundig Tijdschrift*. Deel XXXIII. Batavia, 1874. Accounts about earthquakes in the Northern (near Doreh) and South-western portions of New Guinea have been published in the Description of the Expedition of the steamer "Etna" in 1858, (*Bijdragen to de Taal-Land en Volkenkunde van Nederlandsh Indie*. Deel V., 1862, p. 78), and are mentioned also in the report of travels of Beccari, D'Albertis and Meyer.

direction of some small streams, the old mouths of which had been closed by bars of sand left behind by waves ; a great number of old pathways in the forest, between the villages, which I knew well, having used them daily during 15 months in 1871 and 1872, were impassable on account of many large trees which had come down during the earthquake.

On the hills, the natives showed me in many places long crevices 1-3 feet wide and 3 or 4 feet deep, as the remaining marks of the "*tangrin-boro*" (1). The depth of the sea near the coast in some places has been also altered, so that, for instance in Port Constantine the old soundings made by the officers of H.I.R.M.S. "*Vitiaz*" in Sept. 1871, proved in many details incorrect as well as the outlines of the harbour (Port Constantine).

Talking about earthquakes, the natives informed me, that on a former occasion, before my arrival on the coast in 1871, a village named Aralu (situated on the coast between the rivers, *Gabeneu* and *Koli*) had been completely swept away by the waves after an earthquake. All the huts, and the cocoanut trees surrounding them, were broken down and carried away by the tidal waves, and the inhabitants, men, women, and children were drowned (it occurred during the night.) A few men belonging to the village and who happened to be away at the time on a visit to some neighbouring village, would not attempt to rebuild their huts on the old place, but went to live at Gumbu, also a coast village but which had escaped destruction being built further inland. The destruction of Aralu was well remembered by not very old people and it took place I suppose (2) about the year 1856. The natives on the Maclay-Coast complained about the sickness in the villages on the coast which appeared soon after the destruction of Aralu. The sickness amongst them, I believe, was the result of decomposition of animal

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(1) In the dialect of the Bongu of the Maclay-Coast *tangrin* means earthquake and *boro*, big.

(2) I found the approximate year of this event by the inquiry: which of the young men of the village was born at the time of the earthquake. The man shown to me as being born soon after the destruction of Aralu, could not be more (in August 1876) than about 20 years of age.

and vegetable matter left behind on shore after the inundation produced by the high tidal wave, as has been observed on some Islands of the Pacific (1).

During my second stay at the Maclay-Coast, in 1876 and 1877, I noticed only a few slight shocks of earthquake. In November, 1877, however, I could distinctly hear during some calm nights, a rolling noise in the distance similar to discharges of heavy artillery, as by a bombardment, and a kind of trembling of the ground. Leaving the coast about a fortnight later I found the two Volcanoes on the Island Vulcan and Lesson Island in full eruption, the noise which I heard during the night on my coast, and the slight shaking of the earth were, I suppose, forerunners of these eruptions.

Arrived at Singapore in January, 1878, I heard that some vulcanic disturbances occurred also on the north-east end of New Britain, and in comparing dates I found that that they took place about the same time as I saw the eruptions of the volcanoes on Vulcan and Lesson Islands.

On my way to the Maclay-Coast for the third time, in March, 1883, I saw the volcano on Lesson Island still in activity, and the natives on the Maclay-Coast again complained to me about earthquakes. A few weeks later, when at anchor on the north coast of the Great Admiralty Island, I witnessed the eruption of a volcano on the south coast of the island or on one of the small islands south from the big island (2). It was during the night of March 28th, and I could see a large halo as from an immense fire, and two or three times heavy thunderlike rolling noises were heard, followed by distinct flashes like columns of fire on the horizon.

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(1). A case of great sickness and mortality on the Island Lub (or Hermit Island), in 1875, after the inundation of some low islands of the group by a tidal wave, has been communicated by me, in a letter about the Island Lub, to the Imp. Russ. Geogr. Soc. (*Investiya of the Imp. Russ. Geogr. Soc.*, Vol. XV.) I have heard about a similar case which happened on the Island Mafia (or St. David's Island), some twenty or thirty years ago.

(2). It might, very likely, have been the volcano on the small island called by the natives Loo, and from which they obtain the obsidian for their weapons and implements.

## EVIDENCES OF RISING OF THE MACLAY-COAST IN NEW GUINEA.

Besides the already mentioned changes from shocks of frequent earthquakes, I have noticed in many places on this coast proofs of the gradual rising of the coast. A large extent of the same is nothing but uplifted coral banks, and in the greenish sandy clay (1) which forms the nearest hills to the coast (from 100-400 feet high), I found some layers with remains of marine animals, (Anthozoa, Echinodermata, Mollusca and Crustacea), the appearance of which seemed to prove that the rising of the coast was quite of recent date.

I noticed these remains imbedded in clay in a great many places at different heights over the sea, but always neglected to make a systematical collection of them. At one place, however, near the village Bongu, the layers appeared particularly rich and the specimens well preserved, not broken. Having taken there a few handfuls of the sandy clay, I washed them carefully out and obtained a small collection of shells which, at my request has been kindly examined by Mr. J. Brazier. The shells (38 different species) belong to the following 18 genera:—*Ranella*, *Nassa*, *Mitra*, *Oliva*, *Terebra*, *Conus*, *Strombus*, *Bulla*, *Atys*, *Dendalium*, *Cultellus*, *Corbula*, *Mactra*, *Tellina*, *Venus*, *Cytherea*, *Leda* and *Arca* (2.)

All the shells, *without one exception*, belong to species at present living on the Coasts and Islands of the Pacific.

Amongst debris of different *Echinoidea* and *Crustacea*, I obtained in the clay only one unbroken specimen of *Laganum* (Spec. ?), and the carapace of a small Crustacean (*Myra*, Spec. ?)

Many of the shells from the clay-layers look as fresh as if they had been gathered alive on the shore and well preserved afterwards. But the above mentioned layers of sandy-clay of

(1.) Mr. C. S. Wilkinson, to whom I showed some of the clay, expressed his opinion that this "greenish calcareous sandy clay of Bongu, Maclay-Coast, resembles in lithological character the Miocene Tertiary clay of Yule Island on the south coast of New-Guinea."

(2.) *J. Brazier*. List of some recent shells found in layers of Clay on the Maclay-Coast, New-Guinea. (Proceed. Lin. Soc., Vol. 9, part 4.)

Bongu, are followed by many others, as layers of small boulders and marine detritus of different kinds (mostly coral fragments), imbedded in other layers of clay, and all covered over with a stratum of dark-brown humus of variable thickness, which is the ground for a luxuriant, tropical primeval forest, where trees many centuries old are not uncommon.

Besides the above mentioned layers at different levels above the sea, I have seen large blocks of corals (mostly of the genera, *Meandrina* and *Astraea*), in some isolated spots, where the dense vegetation and the cover of humus has been removed (by man, or accidentally), and the deeper layers of soil, under the humus, left bare. I have noticed such blocks in and near villages many hundred feet above the sea. Once I obtained a piece of coral (*Prionastraea*, spec. ?) amongst small stone in the bed of the river Koli, near Sangdinbi-Mana, not less than 1,200 feet above the level of the sea, and from all appearance the piece was brought down by water (1) from some place higher up. (2.) Another proof that the coast is still rising is the existence of numerous reefs of dead corals which are left quite dry at each low tide.

Considering the facts, that the elevation of the raised coral reefs on different portions of the Maclay-Coast, as well as on the Islands of the *Archipelago of contented men*, presents the same level above the sea, and like the layers of the greenish clay are, as far as I have observed, horizontal, it appears to me not unlikely, that besides the occasional upheavals, there exists a gradual steady rising of this part of the North-Eastern Coast of New Guinea.

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(1.) Some rivers of the Maclay-Coast as for instance the river Koli presents during the dry season, but a narrow band of running water in a very large bed filled with stones of all dimensions and some bands of sand. After heavy rains in the mountains the water rushes with great velocity bringing down more stones and trees, which are left behind in the bed of the river when the water falls to wait for the next rain and the next flood.

(2.) I confess, that the finding of a loose piece of coral cannot be regarded as a decided proof of the origin of the same, from a coral bank raised to over 1000 feet. It might have happened (which however is not very likely,) that the piece of coral has been brought there and dropped by some passing native.